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MEMORANDUM FOR RECORD

12 April 1954

SUBJECT: BRAVO Shot, Operation CASTLE

This Document Consists of 109 pages  
No. 1  
Serial 00-A

1. PURPOSE: To make a matter of record operational aspects that were considered prior to BRAVO event of Operation CASTLE and to analyze the resultant situation in light of available pre-shot and post-shot information.
2. GENERAL INFORMATION: Operation CASTLE is planned to consist of a series of seven detonations at the Pacific Proving Grounds, which encompasses Eniwetok and Bikini Atolls. BRAVO is the code name that was given the firing of the first device, at 0645 M on 1 March 1954, off Namu Island, Bikini Atoll.

Subsequent to BRAVO detonation radioactive debris fell on certain inhabited atolls of the northern Marshall Islands. Radiation intensities rose to levels sufficient to warrant evacuation of four atolls and all personnel were removed from these atolls to Kwajalein in accordance with the operational emergency plan of JTF SEVEN. Areas evacuated and gamma dosages received are indicated below:

<u>ATOLL</u>	<u>POPULATION</u>	<u>DISTANCE FROM GROUND ZERO</u>	<u>DOSES RECEIVED</u>
Ailinginae	17	79 NM	80 R (computed)
Rongelap	82	100 NM	100-130 R (computed)
Rongerik	28 #	133 NM	40 - 98 R (film badge)
Utirik	154	270 NM	17 R (computed)

(#) 28 American Service personnel; 25 USAF Weather Detachment plus 3 USA Signal Corps personnel.

All evacuees are under competent medical care. C 1333

3. PREVIOUS EXPERIENCE AND CHARACTERISTICS OF NUCLEAR DETONATIONS: Radioactive debris is an inherent characteristic of all nuclear detonations. It originates from fission fragments

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MEDICAL ASPECTS OF FALL-OUT FROM BRAVO

1. Medical evaluation of personnel exposed to the radiation from fall-out in case of BRAVO depends to a great extent upon the accuracy with which dosage can be computed. Based upon extrapolation of fall-out time from Rongerik data where the fall-out time was precisely determined by automatic recording instruments, it seems plausible to conclude, after making allowance for factors giving maximum values of time and intensity, that personnel were not exposed to dosages much higher than calculated. This is particularly true inasmuch as Rongerik calculations were in good agreement with observed film badge data on personnel there.

2. The association of symptoms with a given dosage may lead to erroneous conclusions since such tabular relationships have been devised only for whole body penetrating radiation given over a period of a few minutes. It is now generally believed that the symptoms in those tabulations will appear with a smaller dose than indicated. These personnel may develop signs or symptoms out of proportion to what would have previously been expected but could be somewhat tempered by the relatively slow dose rate characteristic of fall-out.

3. With respect to natives, due to the language difficulty, it was extremely doubtful that information obtained by questioning would be reliable.

4. We may draw certain conclusions, however, which seem to be sound concerning immediate prognosis based upon the doses believed to have been received.

5. Considering the personnel involved in exposure to radiation they can be grouped according to location:

a. Rongerik -

Twenty-eight Americans were exposed showing film badge readings ranging from 40 to 98 roentgens during a period of 28.5 to 35 hours. They were evacuated to Kwajalein. It was not expected that any of these men would develop any subjective symptoms. One admitted to feeling badly until reassured after which he admitted that his feeling was probably psychological. First blood counts taken on D plus 1 showed a normal distribution. Generalized loss of hair which usually occurs after 10 days with sufficient dosage was not expected and has not occurred to date. Levels of personnel contamination were not exceedingly high and inasmuch as decontamination was performed on D plus 1, beta burns are unlikely.

b. Rongelap -

Sixty-five natives were evacuated to Kwajalein and may have received doses as high as 130 roentgens in a period of 51 hours. In this case, the level of radiation is about the level which might cause some symptoms such as nausea, vomiting, fatiguability and loss of hair for acute doses. Allowing for the reduced effect from low dose rate it may happen that symptoms as above will occur in individuals who were already ill or in generally poor physical condition. Readings of skin and hair contamination were such that for this exposure time spotty distribution of beta burns could occur within several days. If this occurs, ulcerations might develop which may require several months to heal.

c. Ailinginae -

Seventeen natives on this island were exposed to approximately 80 roentgens in 58 hours. They were evacuated to Kwajalein. It was not expected that any subjective systemic symptoms would develop. However, personal contamination of this duration could conceivably cause beta burns in a spotty distribution with ulceration as described above.

d. Utirik -

154 natives were evacuated to Kwajalein after receiving a dose of 17 roentgens in 78 hours. No subjective systemic symptoms or changes in blood count were expected. Beta burns are unlikely but are possible statistically.

e. Ailuk with 401 natives was not evacuated and the total dose for a life time will be less than 20 roentgens. No medical problem from radiation should occur in the population.

f. Some other islands received fall-out exposing inhabitants to insignificant quantities of radiation.

g. Task Force personnel at or in the vicinity of Bikini Atoll -

Personnel in the concrete bunker on NAH island were evacuated to ships afloat receiving in general comparable dosage to those aboard ships all the time. Based on readings taken aboard the ships it was estimated that none of the ship's personnel would receive more than 10 roentgens whole body radiation. This dose would not cause any general symptoms of radiation sickness, however, decontamination personnel might have skin contact with concentrated radioactive deposits and possibly sustain mild beta burns.

6. All native evacuees were held at Kwajalein for observation and treatment should the need arise. The station medical complement took complete blood counts, made physical examinations and took histories. Captain H. H. Haight, (MC), USN, a radiological medical officer was sent to Kwajalein as consultant on radiation effects to the station surgeon. Daily observation was instituted in anticipation of the arrival of a medical group from the U. S. who were to investigate the patients.

[REDACTED]